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on Migrating Adult Steelhead Trout**

MELVIN REINGOLD

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Effects of Displacing, Hooking, and Releasing on Migrating Adult Steelhead Trout

MELVIN REINGOLD

Idaho Department of Fish and Game, Salmon, Idaho 83467

ABSTRACT

Upstream migrating adult steelhead trout (*Salmo gairdneri*), transported downstream, hooked, and played to exhaustion, returned to their target spawning stream equally as well as fish just transported and released. The number of fish returning to their home stream was inversely related to the distance transported and appears to be directly related to the number of days remaining before spawning.

In streams with large runs of hatchery and wild steelhead trout (*Salmo gairdneri*) a selective fishery may be necessary to adequately harvest the hatchery run (defined by fin marks), but not over-harvest the wild run. A catch-and-release fishery on the wild fish is a possible means of protecting the wild stocks while allowing a sport fishery.

Transporting hatchery steelhead back downstream or upstream from the hatchery is a possible method of increasing the sport harvest on these fish or of relieving a hatchery of surplus adult returnees.

In 1972, 1973, and 1974, I conducted experiments to assess the effects of hooking and releasing displaced adult steelhead on the ability of these fish to return to their spawning stream.

STUDY AREA

The Pahsimeroi Steelhead Collection Facility is located near the mouth of the Pahsimeroi River, a tributary of the Salmon River, some 1,290 km upstream from the mouth of the Columbia River. Adult hatchery steelhead returning to this station originated from a stock that returned to the middle section of the Snake River. Eggs from the returning adults are taken to the Niagara Springs Steelhead Hatchery near Twin Falls, Idaho, where the juveniles are reared to smolt stage, then transported back to the Pahsimeroi for release.

METHODS

I used adult steelhead (hatchery origin) returning to the Pahsimeroi River in my transport and catch-and-release experiments.

I could not collect large numbers of wild steelhead for the experiments, but I believe the behavior and physical attributes of hatchery and wild adult steelhead are similar.

Hook and release procedure consisted of hooking the fish through the lower jaw with a size 4 fish hook on the end of standard steelhead spinning tackle and allowing the fish to swim out into the river by releasing the bail on the reel. When the fish reached the center of the river, we closed the bail and played the fish back to the bank. We repeated this until the fish was apparently exhausted (lying on one side and gasping). We marked the fish by making a small hole with a paper punch near the posterior edge of an operculum, removed the hook, and released the fish. Controls were released without hooking and playing, after being marked in the same manner on the opposite operculum.

All fish were transported in a portable, aerated, 750-liter tank. No anesthetic of any type was added to the tank water. The steelhead were removed from the tank with fine mesh nets, and care was used to avoid any physical injury to the fish.

Fishery personnel operating the Pahsimeroi Steelhead Collection Facility checked all adult steelhead entering the station trap and noted the arrival of all returning marked fish.

1972

On 21 and 22 April 1972, we collected 40 adult steelhead from the Pahsimeroi station holding pens and transported them back down the Salmon River 80 km. We hooked and played 20 of these and released 20 as controls (Table 1).

TABLE 1.-The groups of played and unplayed steelhead released into the Salmon River downstream from the Pahsimeroi Steelhead Collection Facility, numbers released, and numbers that returned to the facility, 1972, 1973, and 1974.

Group	Dates released	Distance downstream	Number		Percent returned
			Released	Returned	
Hooked and played	April 20, 1972	80 km	20	1	5%
Unplayed	April 21, 1972	80 km	20	8	40%
Hooked and played	April 10, 1973	16 km	40	36	90%
Unplayed	April 11, 1973	18 km	40	35	88%
Hooked and played	April 12, 1974	16 km	30	24	80%
Unplayed	April 11, 1974	18 km	30	30	100%
Hooked and played	April 15, 1974	80 km	30	10	33.3%
Unplayed	April 12, 1974	80 km	30	7	23.3%

1973

On 10 and 11 April 1973, we repeated the 1972 experiment, but we doubled the number of fish (40 hooked and played, 40 released as controls) and conducted the experiment 16 km downstream from the Pahsimeroi River.

Also, on 11 April, we transported 20 adult Steelhead from the Pahsimeroi station up the main Salmon River. We marked and released half the fish 16 km, and the remainder 40 km, upstream (Table 2).

On this same date, we also transported 42 steelhead downstream from the Pahsimeroi station. We marked and released 10 fish at the mouth of the Pahsimeroi River, 5.6 km downstream from the trap; 10 fish 40 km downstream from the Pahsimeroi; 10 fish 80 km downstream; and 12 fish 120 km downstream (Table 2).

On 4 May 1973, we transported another group of adult steelhead back downstream and released 10 at the mouth of the Pahsimeroi, 10 fish 16 km downstream and 10 fish 40 km downstream (Table 2). We used vari-

ous combinations of opercle punch marks to differentiate among groups.

1974

Between 11 and 15 April 1974, I transported 120 adult steelhead back down the Salmon River from the Pahsimeroi station. I released 60 of these fish 16 km downstream, 30 played to exhaustion, and 30 controls. I released 60 fish 80 km downstream, 30 hooked and played and 30 unplayed.

RESULTS AND DISCUSSION

1972 Experiment

Of the 40 fish released in the 1972 experiment, nine (22.5%) returned to the Pahsimeroi station. One fish was from the hooked and played group and eight from the group that was released unplayed (Table 1). Thirty-one fish never returned to the weir, which made me question the effects of hauling and led to the 1973 experiment.

TABLE 2.-The groups of adult steelhead transported up and downstream on the main Salmon River from the Pahsimeroi Steelhead Collection Facility, and the release areas and returns, 1973.

Experimental groups	Dates released	Distance released	Number		Percentage returned
			Released	Returned	
Transported downstream	April 11	Mouth of Pahsimeroi	10	8	80%
Transported downstream	April 11	16 km	40	35	88%
Transported downstream	April 11	40 km	10	10	100%
Transported downstream	April 11	80 km	10	6	60%
Transported downstream	April 11	120 km	12	5	42%
Transported downstream	May 4	Mouth of Pahsimeroi	10	9	90%
Transported downstream	May 4	16 km	10	7	70%
Transported downstream	May 4	40 km	10	5	50%
Transported upstream	April 11	16 km	10	2	20%
Transported upstream	April 11	40 km	10	3	30%

1973 Experiment

Of the 80 fish released in the 1973 hook and release experiment, 71 (88.7%) returned to the station, all within 3 weeks; 36 were from the hooked and played group and 35 from the unplayed group.

Of the 92 fish hauled varying distances from the station, 55 (59.7%) returned to the station. Generally, the farther downstream we displaced fish, the less apt they were to return to the Pahsimeroi station. Fish displaced upstream returned in fewer numbers than fish displaced downstream (Table 2).

Generally, fish displaced downstream in early May returned in fewer numbers than fish displaced downstream in early April (Table 2). (The disparity in returns between the groups released at the mouth of the Pahsimeroi in April and May may be due to the illegal harvest of at least one April-released fish, as reported by the local Conservation Officer. The case, however, was unproved.)

1974 Experiment

Of the 120 fish marked and released in 1974, 71 (59.2%) returned to the station. All returned within 3 weeks except one fish (unplayed 80 km downstream) that returned the fourth week after release. Both played and unplayed fish returned about equally well. The fish released 16 km downstream returned in larger numbers than those released 80 km downstream (Table 2). Two of the fish transported 80 km downstream (one from the played group and one from the control

group) were noted passing a weir on the Lemhi River, a tributary of the Salmon River some 65 km below the Pahsimeroi River and 16 km upstream from where the steelhead were released.

Comparing the 1974 and 1972 returns from the 80-km downstream displacements, I believe that the added stress of a late release date accounts for the differential response of played and unplayed fish in 1972.

The results of the experiments indicate that hooking and releasing an upstream-migrating steelhead, without inflicting gross injury, has no apparent effect on its ability to reach the target spawning stream. It appears that the ability of steelhead to return after being transported downstream or upstream from the home stream is inversely related to the distance they are hauled. The 1973 experiment also indicates that steelhead transported downstream closer to spawning time return in fewer numbers than those relocated earlier in the season.

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